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## ABSTRACT

The shift to new paradigms in education pushed by new media has initiated a critical rethinking in the conversation about and practice of teaching and learning. This paper proposes a new description of curriculum design based on a traditional conceptual knowledge framework. The goal is to make a theoretical contribution for interpreting the development of educational technologies and integrating them into Western teaching and practice. Discussion includes knowledge as a relationship; basic properties of knowledge; and learning as the activity of establishing a knowledge relationship and new media as powerful tools. An undergraduate course is described, "The Institutional and the Society," in which digital media support was to provide "live" portraits describing the goals and activities of different institutions (for example, Amnesty International), to be matched with the theoretical approach offered during lectures. Discussion then moves to user-centered design in adaptive hypermedia systems; learning as being in dialog; and the role of teaching. (Contains 24 references.) (AEF)

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## Knowledge as Relationship and E-learning

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**Abstract:** The shift to new paradigms in education pushed by new media has initiated a critical re-thinking of the way we talk of and practice teaching and learning which is still open. Some concepts of the Western educational tradition can be helpful in finding a new way of integrating IT in learning. This paper propose to consider knowledge as a relationship and shows how this provides helpful insights in instructional design and in the exploitation of new media in education.

### Introduction

During the last decade the communities of educators and instructional designers have experimented the impact of IT in their professional activity with an impressing rush. The shift to new paradigms of education has been accompanied by great hope and many hypes. Mixed to real opportunities and to a sometimes ideological debate, something has actually happened: maybe not in the way we teach and learn, but in the way we consider and understand education. New technologies have acted as a catalyst on the way we think about learning and teaching, on the categories we use for designing and talking about education. New media have been the impact wave that rumbled the system and brought to a conceptual paradigm shift in Western education, concentrating and empowering the forces that were already latently in motion. Nevertheless, while the aggressive speed of technology gave a first impulse to the shift, it left little energy for a thorough rethinking of education. Issues brought from the Psychology and Education communities are the topics for a discussion which is still open and lively.

This paper proposes a first description of a new approach to curriculum design based on a traditional conceptual framework. Goal of this paper is to bring a theoretical contribution for interpreting the development of educational technologies and integrate them into the Western teaching and learning practice. The basic understanding of learning and of knowledge is in fact the soil in which the plant of a well-shaped education system can grow, thus we propose to consider some of the issues raised by e-learning going back to the roots of traditional Western educational theories. Maybe surprisingly, this approach does not end up in a conflict, but offers a fruitful mindset and several high-level design principles for new learning environments.

### Knowledge as a Relationship

Knowledge is one of those words that anybody understand effortlessly until required to provide a definition, just like *consciousness*, *I*, or *time*.

In the last decades, Information Systems and - more recently - Knowledge Management literature proposed a vision in which knowledge is produced, stored and retrieved. Managing knowledge with IT systems is indeed a process which much resembles a production chain, and modeling such situations actually requires a precise definition of knowledge. A certain overstatement and unclear understanding of these disciplines have brought to the spread of such metaphors outside their application domain to that of curriculum design and education, specially in the field of new media in education. This conception of knowledge, though effective in many contexts, does not fit completely and hides ambiguous implications for an educational system.

Outside conferences in fact we talk of knowledge in quite another way. We mainly use a verb, more than a noun, the latter being the abstract word we use when we need to substantiate the action. "Of course I *know* him, I met him last month in Wandsworth" "Wandsworth? Oh, yeah, I *know* where it is. It's near Clapham, isn't it?" In common language, *to know* is the action involving knowledge: a subject and an object of knowledge are put in relationship by this verb.

Classic philosophy and medieval scholastic considered knowledge as a relationship between a *subject* person and (a part of) reality, an object, a place, an invisible essence or another person, that we call a *knowledge object*. Learning was conceived as a dynamic through which this relationship was put into place. Taking that perspective, on the track of authors who re-proposed it more recently such as (Loneragan 1957) and (Loneragan 1990), we claim that knowledge has the status of *relationship*, which is an activity of a person's and can not be stored, codified in bits and measured - at least directly. What can be measured, stored, retrieved and transmitted, are data and information, which are the basic part of a more complex phenomenon called knowledge.

This approach to learning and knowledge is insightful as it concerns the exploitation of new technologies in education and provides powerful concepts for tackling many design issues.

### *Cognition as Establishing a Relationship*

Cognition is therefore a process aimed at establishing effective knowledge relationships between the subject and the world. Learning can be modeled as a dynamic occurring on three levels: experience, understanding and judgment.

At first, learning could be described as a process with three main steps, each of them defined by the specific questions concerning the main knowledge object (Loneragan 1990)

- *Experience* is the level in which the subject perceives the object. Perception is to be understood as a partially unconscious but active process, such as in the research track initiated by the New Look (Bruner & Goodman 1947) (Bruner & Goodman 1949). This is the level mainly addressed by Dewey's work in the first part of '900 (Dewey 1900) (Dewey 1938), who considered schools as the place where an intensive experience of the world could be made.
- *Understanding* is the level in which the subject asks "what is it?" or "how does it work?" and develops an enquiry until he/she "gets it", i.e. reconstruct a mental model for the specific knowledge object she is considering, eventually afterwards reworking it as a concept through generalization and abstraction. This is the level mainly concerned by the current work of Constructivism in education.
- *Judgment* is a further level, often unconsidered but essential, in which the subject turns to the acquired understanding or concept and asks "is it true?" or "is it adequate to my experience?". This step requires the gathering of evidence (as recognition of fact, or as activation of previous knowledge) in order to accept the model constructed by the learner: thought is transformed in knowledge.

But learning is of course not only a process, but a dynamic (as represented in Figure 1) in which each level is influenced and influences its neighbors. Concepts and understanding e.g. influence our perception in a "top-down" manner, exactly as previous knowledge on the level of judgment influences concepts and understanding

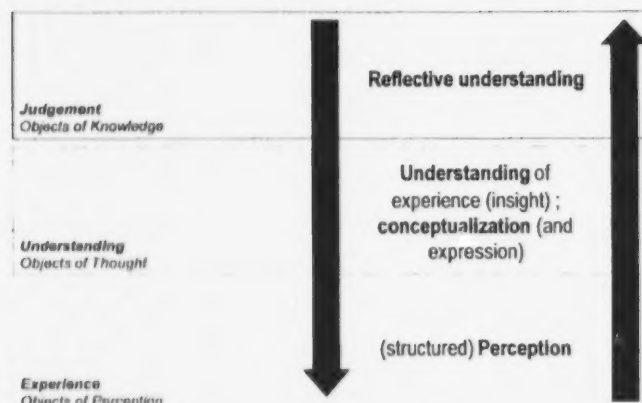


Figure 1 - the learning dynamic

A more detailed of this model, here just sketched, can be found in (Lonergan 1993). Considering learning with an interdisciplinary approach, it is interesting to see how this traditional insight matches and merges with more recent studies and with current information and communication theories, e.g. memory studies - remarkably (Glenberg, A.M. 1997) - or cognitive science, like in (Brennan 2002), (Staudinger & Joos 2000) or (Carassa & Tirassa 1995).

It is clear, and it is one of the greatest gains in the current educational discussion, that this process is undergone *in primis* by the learner. IT can not guarantee learning, but may help establishing or renewing knowledge relationships by managing adequately data and information, providing support for conceptualization and creating a favorable social environment.

#### Properties of knowledge

Considered this way, knowledge presents four basic properties:

- Knowledge is *synthetic*: real knowledge, as real relationships, is somehow "natural", and in act is not reflexive. We really know something when this shapes our action: knowledge, as any kind of relationship, is actually owned inasmuch it becomes a habit [1]. A knowledge relationship is an operative synthesis of experience, understanding and concepts.
- Knowledge is *inter-connected*: each bit of knowledge is not independent in one's mind: in non-pathological situations, all of them should be harmonized, put together in order to form a consistent whole, one unitary vision of the world. This process was described e.g. by the piagetian concepts of *acquisition* and *accomodation*.
- Knowledge is *extra-connected*: human understanding and knowledge operate on the dimension of totality. Any experience - which is the only source of knowledge - is positive if it opens, requires, and introduces to other new experience (Dewey 1938): one bit requires, like magnetic attraction, to be completed with other knowledge. The extra-connectedness of knowledge is therefore a reflection of the innate human curiosity and attitude toward learning, and on the other side, of the (perceived) connectedness of reality itself.
- Knowledge is *current*: as relationship, knowledge develops and has effect in the *hic et nunc* of an action. Once acquired and established, knowledge can become somehow latent, like a relationship with a friend we seldom meet: the relationship still exists but is like asleep. In the same way, we know objects we do not handle any more, e.g. because we have changed our job place. Knowledge

[1] From the Latin *habitus*, dress. It recalls the *habit* change that effective communication produces in the addressee according to the Pragmatics paradigm.

is still there and still interacts with other knowledge bits as part of the whole interconnected system, and still suggests new experiences to be acquired as part of the extra-connected system.

We will show in the following paragraphs that this perspective allows powerful insights in learning and in designing and managing learning with new technologies. IT are in fact tools that can play a role in learning.

### New Media in Education: Tools for a Relationship

In the proposed perspective, learning is the *activity* of establishing a knowledge relationship, and as such requires a subject actor, some one who holds the ends of the process and execute it. In order to be a real and complete activity, the whole subject should be involved, i.e. his/her reason, will and affection [2].

Consequently, none can learn for someone else: like eating or breathing, none can do that for us. Put it the other way round, none can grant that someone else will learn, as personal freedom is required. As a good teacher is not a warranty for his pupils to get a graduation, educational designers should keep in mind that no structured learning environment or skilled tutoring system can grant success. Even more, no technology allows let us to take knowledge acquisition or creation for sure. Everything can help us, support us, let us learn more easily and quickly – nothing can take our place.

In this view, new media represent powerful tools. The simple fact of providing a more structured and rich environments can in fact be a help for learning. On the other hand, several studies from cognitive science (Light & Light 1999) and web usability (Stover, Coyne & Nielsen 2000) have proved that learning to use a technological apparatus is a job in itself – both for teachers and learners. This is one reason why with IT good students perform even better, while the other still lag behind. In any case, we have to discard many of the elearning hypes stating “learn faster, learn better” or “increase your knowledge”. Moreover, IT have higher *affordance* as media (Clark & Brennan 1991), and so are more likely to be actually used by learners only when really necessary for more effective learning.

How can this issues be addressed from the point of view of curriculum design? In this paper, three general topics will be discussed: the definition of a role for new media in a real educational environment; user-centered design and adaptive systems; teaching roles in educational environments.

#### Defining the Role

New media, as tools that may be exploited in teaching and learning, should be carefully controlled and managed. The complexity and power of technology has revealed the necessity for a more structured process of instructional design, and requires the interaction of different professional profiles for an effective implementation and management (Harasim et Al. 1985). All this effort is rewarding only if these tools are properly introduced for supporting educational activities.

A structured model of the learning process as the one proposed above can be used as a sort of map for planning such introduction. At any moment in the learning dynamic, tools can be used for supporting the current status, e.g. conceptualization, reflective understanding, etc. This allows to define exactly what is expected from a technological system, and – most of all – what cannot rely on the system.

For the course *The Institutional and the Society*, given for 180 freshmen at the Università della Svizzera italiana, the Istituto Comunicazione e Formazione developed a set of 22 online multimedia case studies offering texts, video and audio materials taken from newspaper, radio and TV programs, describing the nature, goals and activities of different institutions (e.g. UNO, Amnesty International, etc...). Goal of the digital media support was to provide “live” portraits of the institutions, to be matched with the theoretical approach offered during lectures. Their use was planned at two levels, according to our model:

- Objective 1 Providing an overview of real and active institutions: on the level of *experience*, the digital materials were used to let students make acquaintance with the object of their study;
- Objective 2 Offering real case-studies: on the level of *judgment*, the external description of institutions could be used for verifying the matching of theory and practice.

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[2] This is true also from a juridic point of view: any suspect will not be condemned if he was not able to understand what he did, or if he had done it not freely, e.g. under direct menace.

During Summer Semester 2002, while such materials were in use, the teaching staff encountered some mismatch between their expectation and the actual results being performed by the students [3]. While students got perfectly the importance of the digital materials for more concrete and practical perspective of the course (objective 1), they had difficulties in analyzing with some degree of detail the case studies (objective 2). The structured requirement analysis briefly reported above was then the possibility for tracking the causes of the problem, and the model of learning was a way for interpreting them and figuring out a viable solution.

The missing step for objective 2 was a lack of understanding of two elements:

1. The case studies in relation with the concepts proposed in the course: students did not have the time to grasp the concepts in the course *before* working on the case studies, so that concepts where no help in getting an insight of the particular institution being analyzed.
2. On the other hand, the great complexity and variety of institutional communication made it difficult to define concepts inductively, starting from the case study itself in order to re-construct the concepts.

This analysis allowed to define specifications for a redesign of the digital materials and of their introduction in the course (they are currently under revision and will be implemented in Winter Semester 2002/2003). Each case study will present a sort of "introductory path" leading the students through the main digital materials and providing one working hypothesis for a more structured analysis and understanding of the single institution. Moreover, one lecture will be devoted to work with groups of students on one case study, so to show how the connection theory-practice can be achieved.

#### *User-Centered Design and Adaptive Systems*

User-centered design is a concept, taken from engineering and interface design, which is being successfully applied to education. Curriculum designers should be concerned with making learning more effective and attractive, and this can not be done without considering the peculiarities of each learner. We have to consider that in a lifetime, a person will pass through a number of knowledge re-structuring steps, when new knowledge relationships are integrated with previous knowledge, forming one whole dynamic and interconnected system (see above). Any single act of learning belongs to a history and concerns all previous knowledge. Moreover, each of us has a personal way of learning and a different mix of learning styles (Kolb 1999). Each learner is unique, in him /herself and for his/her personal history and knowledge relationships.

Yet it should not be forgotten that knowledge relationships have two poles: the learner on one side *and* the object on the other. In a real situations, this means a discipline, learning materials, and a teacher. User-centered design means a stress on the learner, which nevertheless should not forget the other pole. Even more, it should focus on both of them as a system.

In designing an education system, the learners' previous history and learning style should be taken into account. Adaptive hypermedia systems (De Bra & Calvi 1998) (De Bra, Houben & Wu 1999) and student modeling research (Kay 2001) consider these issues, which on the other hand can be included also in less sophisticated educational environments design. Tutoring and mentoring describe didactical relationships that may adapt the learning experience to each learner's personality. The very role of teacher (or facilitator) could in fact be understood as the person who monitors the learning process and supports it in critical events. A student tracking system can from this point of view an important success lever in an educational environment.

In the course *The Institutional and the Society* described above, students were asked to post a synthesis and an evaluation after lecture. On the one side, this helped students to build progressively a set of notes for rehearsal; on the other side, allowed the teaching staff to monitor the level of understanding of the class, possibly to individuate particular cases that could benefit of extra support.

#### *Learning as being in dialogue*

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[3] Observation has been conducted with three instruments: a survey for each lecture (average of students answering: 104 out of 180); semi-structured interviews with a group of 20 students; an open discussion with the whole class at the end of the course.

Learning, as the activity aimed at producing or acquiring knowledge, is essentially a dialogic activity. Establishing a knowledge relationship with an object means being in dialogue with it – once more, the activity is stretched between two poles.

But the creation of a new relationship does not happen in an empty space. All knowledge relationships, form a whole, which is the perceived world of a person's. Among these relationships there are person-to-person relationship, which define the social context. Any creation or modification or re-actualization of a relationship is therefore, at least potentially, a social activity. This is why learning is as well and traditionally the gateway to *belonging to a community* and knowledge the sign of belonging in so many cultures.

Starting from Vygotsky (Vygotsky 1978) collaborative learning research and CSCL have the merit of revealing the importance of the social dimension of learning (Dillenbourg et Al. 1996). This has been often translated into peer-to-peer interaction models, which catch only half of the issue. The fact is that when saying *collaboration*, we should include the teacher/instructor as well: he too collaborates with the learners – he is somehow a learner as well, renewing his/her own knowledge relationship. In the next paragraphs we will focus with more detail on this issue. If the consideration of the educational environment as a whole system (learners-teacher-object-materials) takes the proposed perspective, social interaction in learning acquires a more relevant meaning, passing from being one among several didactical techniques to representing an essential element in learning. This is way any communication system (an online forum, email, meetings) is a critical element in any educational environment.

The learning model proposed above can be a track for planning social interaction at precise step of the cognitive development. Some of the step in the learning dynamic are in fact intrinsically social, while other are strictly dependent on personal engagement. Conceptualization, for instance, can be enhanced by exposition and negotiation of definition; on the other hand, understanding - as getting an insight of a situation - is an individual achievement coming from individual work.

The last two paragraphs have already introduced the relevance of teaching roles in education. On this topic is focused the last part of the paper.

### On the Role of Teaching

The most common way for getting in confidence with someone, be it a successful business man that can finance our projects or a beautiful girl that could hopefully marry us, is chatting. The art of chatting is that of finding common interests, of meeting other people on a ground that they can move on with confidence. A known person who introduces us, and suggests us possible conversation topics is a key factor that can increase dramatically our success chances. Chatting can be used for creating the common soft atmosphere of mundane dinners, as well as for getting in confidence with people we can help, such as patients in a hospital or children at school. It is a common way for initiating an eventually stable relationship. The teacher is somehow the person who introduces us to a new knowledge relationship, suggesting interesting and relevant topics, showing us the right communication protocol, providing advice on a favorable language. A teacher is the element that can start the communication flow in the right way. In the beginning, he/she may even embody the dialogical pole the student has to come in touch with, by representing the subject matter in itself, by being directly (or through a medium) in dialogue with students.

But as any professional mediator, the teacher is a time-bound presence, tending to disappear. The more the learner actually learn, the more his/her relationship with the object is stable and strong, the less the teacher is required. Once introduced to each other, the teacher can not require any percentage on the agreement – it was just his/her duty. This ability to introducing pupils to new relationships, and this habit of professional shyness should be the goal of all didactical skills. If we consider higher education, the teacher introduces students not only in a discipline, but in the social environment of a scientific or professional community, acquires.

Out of the metaphor, a teacher - or better, the array of teaching roles configured in any real educational environments: trainer, tutor, coach, media designer, etc. - is the one who consciously controls, anticipates and support the learning dynamic, intervening at different moments with different tools.

This short considerations, which would actually require more space, are the basis upon which we claim that the word *teacher* should not be canceled by the e-learning vocabulary. Of course learning acquires new horizons, but still a relationship can be better and more effectively established if a good teacher provides help. Moreover, several researches show that new media increase the requirements of staff activity and training (teachers, instructors and tutors) in education (Flueckiger & Mazza 2001) (OU 2000).

### *The teacher is a learner*

What makes a teacher as such is his/her continuous learning, i.e. the continuous reshaping, adaptation, deepening of his/her personal knowledge relationship with what is being taught. A teacher is lively knowledge in action who invites motivated and interested learners to take part in the movement.

From this perspective lifelong education for teachers is necessary, covering both didactical skills and domain competence. The opportunities offered by e-learning in this domain are therefore appreciable and valuable. This should possibly avoid the trap of simply "being technologically up-to-date": keeping a knowledge relationship lively means much more than that, and means keeping alive motivation (reason and will) and be in touch with a social environment (learning is dialogic) that foster knowledge, a scientific community. We believe that any of our readers will probably have in mind such teachers in his own learning career more than other, maybe didactically skilled teachers.

### Conclusions

In this paper we faced some elearning issues starting from very far, going back to one of the roots of Western educational theories, as renewed in more recent authors' work. We did this in the belief that a condition for a successful integration of new media in education is a critical rethinking of education as such, and this can be achieved only renewing our epistemological and pedagogical tradition.

We proposed a conception of knowledge as relationship and tried to show how this approach is scientifically valid and promising for developing a framework for curriculum design and new media in education. We proposed some examples in education theory, education system management and instructional design.

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